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EXAMINER	
CLARK, MAXWELL A	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,123	LITTLE ET AL.	
	Examiner	Art Unit	
	MAXWELL A. CLARK	4183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/28/2005,02/25/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The purpose of the abstract is to enable the United States Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure, regardless of his or her degree of familiarity with patent documents, and should include that which is new in the art to which the invention pertains.

2. Claims 2-4, 19-21 and 25-27 are objected to because of the following informalities: "multiplexors" should be changed to "multiplexers". Appropriate correction is required.

Drawings

3. The drawings are objected to because the rectangular box(es) shown in the drawings should be provided with descriptive text labels. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 2-5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Regarding the N to M/2 signal multiplexing found in line 5 of claim 2, N to M/2 multiplexing is not described in the application as filed. N to M multiplexing is clearly described throughout the application without mention, description, obviousness or inherency of N to M/2 multiplexing.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 15, 16, 19, 20, 22, 24 and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Regarding claims 15 and 16 the phrase "should be" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

9. Regarding claims 15, 16, 19, 20 and 24 the phrase "thereby" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

10. Claim 22 recites the limitation "the two beam formers" in lines 4 and 6. There is insufficient antecedent basis for this limitation in the claim.

11. Claim 24 recites the limitation "the platform" in lines 4 and 6. There is insufficient antecedent basis for this limitation in the claim.

12. Claim 31 recites the limitation "the control circuit" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 1 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Tümer (USPN 6,333,648).

Regarding claim 1, Tümer discloses an application specific integrated circuit (ASIC) adapted for use in a plurality of circuit configurations (col. 2, lines 18-20, wherein the multichannel readout chip corresponds to an application specific integrated circuit (ASIC)), said circuit configurations providing for different numbers of signal channels for further processing using same circuitry of said application specific integrated circuit (col.2, lines 20-23). In addition, see in particular (col. 2 and 3, lines 64-67 and 1, 10-12 respectively).

Regarding claim 12, Tümer discloses determining a number of channels for use in a data path (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a

number of channels for use in a data path corresponds to selecting from the different readout modes, i.e., the sparce, global, trigger, select all external delay, near neighbor, force enable, etc. modes); and configuring an ASIC adapted for use in a plurality of configurations to provide said determined number of channels (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path corresponds to selecting from the different readout modes, by selecting any of the said modes is effectively configuring the ASIC to provide determined number of channels).

15. Claims 25-29 and 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Knell et al. (USPN 6,468,213 B1).

Regarding claim 25, Knell discloses a sonogram imaging system (Title, wherein the ultrasound system corresponds to the sonogram imaging system) including a transducer (col. 18, line 43); a beam former (col. 18, line 45); a data path including a plurality of information channels connecting the transducer to the beam former (col. 18, lines 63-67 wherein the signal processing path, including signals prior to beam-summing corresponds to a data path including a plurality of information channels connecting the transducer to the beam former); and an ASIC in communication with the data path between the transducer and the beam former, including circuitry operable as a bank of multiplexers to decrease a number of the information channels from the transducer to the beam former (col. 18, lines 26-45, wherein the system, i.e. ASIC, includes de-rotation multiplexer between the transducer elements and the beam former inputs, examiner takes official notice that multiplexing the transducer elements between the transducer elements and the beam former inputs will decrease the number of the

information channels from the transducer elements and the beam former inputs; col. 13, lines 25-32 and lines 42-45).

Regarding claim 26, Knell discloses the circuitry of an ASIC comprising a plurality of 2:1 multiplexers, wherein each multiplexer includes an enable switch and a select switch (fig. 12p, element 1242; col. 15, lines 6-19, wherein multiplexers 1242 and 1243 together with A and B inputs muxed via the multiplexer corresponds to the plurality of 2:1 multiplexers with the multiplexer controlled by control 1245, additionally, multiplexers inherently includes an enable and select switch).

Regarding claim 27, the ASIC of claim 26 is controlled via the beam former control since the ASIC is part of the beam former controller (col. 3, lines 37-38, wherein the beam former controller 12 comprises an ASIC; fig. 12p, element 1242; col. 15, lines 6-19, wherein multiplexers 1242 and 1243 together with A and B inputs muxed by the multiplexer correspond to the plurality of 2:1 multiplexers with the multiplexer controlled by control 1245, hence, providing higher order multiplexing functionality, additionally, multiplexers inherently includes an enable and select switch).

Regarding claim 28, Knell discloses a digital serial control bus to connect the enable and select switches to the beam former (col. 11, lines 50-51, wherein the data samples may be digital data samples from the beam former, in the case of digital data samples, examiner takes official notice the control bus to connect the enable and select switches to the beam former are digital since the invention includes digital circuits, hence digital controls).

Regarding claim 29, Knell discloses a sonogram imaging system (col. 11, line 46, wherein the ultrasound system corresponds to the sonogram imaging system) including a transducer (col. 11, line 47); a beam former (col. 11, line 46); a data path including a plurality of information channels connecting the transducer to the beam former (col. 11, line 45-55, wherein the receive signals from the N transducer elements labeled EL0, EL1 ... ELN correspond to the plurality of information channels connecting the transducer to the beam former); and an ASIC in communication with the data path between the transducer and the beam former, including circuitry operable as a summer/cross-point switch, to route a number of information channels from the transducer to the beam former (figs. 12E-12L; col. 2, line 47; col. 12, line 18 wherein the routing of a number of information channels from the transducer to the beam former corresponds to the receive processing path; col. 18, lines 31-35, wherein the summers described as application specific integrated circuits (ASICs)).

Regarding claim 32, Knell discloses circuitry included by the ASIC controlled by the beam former via a bus (col. 4, lines 21-29, wherein the beam former comprises an ASIC, hence the ASIC is controlled via the beam former, it is inherent that the control of the ASIC by the beam former is done via communication bus).

Regarding claim 33, Knell discloses a beam former which sends instructions to logic included in the ASIC (col. 3, lines 36-57, wherein the beam former controller comprises an ASIC for control, hence the beam former sends instruction to the logic included in the ASIC; col. 4, lines 21-29, wherein the beam former controller comprises an ASIC for control, hence the beam former sends instruction to the logic included in the

ASIC wherein the beam former sums the signals from the transducer elements, i.e. instructions to process data as a summer).

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

18. Claims 2-9 and 14-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tümer (USPN 6,333,648) in view of Angelsen et al. (US 2005/0203402 A1).

Regarding claim 2, Tümer discloses an ASIC wherein the ASIC is configured for signal multiplexing (col. 3, lines 43-44).

Tümer does not expressly disclose N to M signal multiplexing, wherein in a first configuration of said circuit configurations said ASIC is configured to provide N to M signal multiplexing, and wherein in a second configuration of said circuit configuration said ASIC is configured to provide N to M/2 signal multiplexing.

Angelsen discloses N to M signal multiplexing , wherein in a first configuration of said circuit configurations said ASIC is configured to provide a plurality of N to M/2 signal multiplexing (paragraph [0035], fig 3d, wherein the configuration of the front end consist of a plurality of N to M/2 multiplexers, i.e. 4 to 1), and wherein in another configuration of said circuit configuration said ASIC is configured to provide N to M signal multiplexing (paragraph [0036], wherein multiplexers set up the array coupling means, i.e. another configuration, similar to fig 2c and 2d which illustrates N to M, i.e. 4:2 multiplexing), for the purpose of providing symmetric delays around the aperture center.

It would have been obvious to one of ordinary skill in the art at the time of the application to modify Tümer to include N to M signal multiplexing, wherein in a first configuration of said circuit configurations said ASIC is configured to provide N to M signal multiplexing, and wherein in a second configuration of said circuit configuration said ASIC is configured to provide N to M/2 signal multiplexing for the purpose of providing symmetric delays around the aperture center so that the beam former operated switched array symmetric delay apertures.

Regarding claim 3, Angelsen discloses a plurality of multiplexers include N signal inputs, M signal outputs (see in particular paragraph [0035]), at least one select signal input, and at least one enable signal input, said enable signal input being utilized in providing said N to M/2 signal multiplexing of said second configuration (paragraph [0026], wherein the array coupling means 102 can contain flexible multiplexers that are set up by the control processor 111 over the bus 110, so that one can have selectable

element to T/R circuit connections for one particular transducer array, multiplexers inherently have an enable input).

Regarding claim 4, Angelsen discloses the plurality of multiplexers divided into hardwired pairs (fig. 1a), and only one of each pair is enabled during a receive operation (paragraph [0024], where in the output of the receiver amplifier corresponds to a receive operation and said output of the receiver is fed to one of the inputs of the many to one multiplesexers 112 corresponds to only one pair being enabled).

Regarding claim 5, Angelsen discloses select signal input and said enable signal input comprise a digital serial control bus (see in particular paragraph [0024], wherein the digital serial control bus corresponds to bus 110).

Regarding claim 6, Tümer discloses an application specific integrated circuit (ASIC) adapted for use in a plurality of circuit configurations (col. 2, lines 18-20, wherein the multichannel readout chip corresponds to an application specific integrated circuit (ASIC)), said circuit configurations providing for different numbers of signal channels for further processing using same circuitry of said application specific integrated circuit (col.2, lines 20-23). In addition, see in particular (col. 2 and 3, lines 64-67 and 1, 10-12 respectively).

Tümer does not expressly disclose the ASIC configurable to provide a cross point switch function in a first configuration of said circuit configurations and to provide a signal summer function in a second configuration of said circuit configurations.

Angelsen discloses one configuration of an array coupling means as a cross-point switch, i.e. cross-point function, for the purpose of connecting symmetric pairs of

elements (see in particular paragraph [0026]). Another configuration is disclosed wherein the circuit produces the sum of the current or voltage, i.e. signal summer function, for the purpose of providing the digitized sum signal (see in particular paragraph [0026]).

It would have been obvious to one of ordinary skill in the art at the time of the application to modify Tümer to include a cross-point and signal summer functions as disclosed by Angelsen to enable the connection of symmetric pairs of elements and to provide signal sum to the digital beam forming circuits.

Regarding claim 7, Angelsen discloses a cross-point switch function comprises selectively routing signal channels to one or more beam formers (fig. 2d, paragraph [0030], wherein the cross point switch connects symmetric pairs of elements to the T/R circuits; as illustrated in fig. 2d, the array coupling means 102 routs signal channels to the beam forming circuits 114).

Regarding claim 8, Angelsen discloses a symmetric signal summing operation (see in particular paragraph [0030]).

Regarding claim 9, Angelsen discloses symmetric signal summing operation comprises summing one or more signals that are determined to be of similar weight and delay (see in particular paragraph [0029-0030], wherein the summed signals are appropriately delayed, amplitude scaled and summed to form a dynamically focused beam with beam central axis normal to the array surface, the symmetric positioning around the aperture center produce signals that are very similar in their delay and weight due to their symmetry about an axis of the aperture).

Regarding claim 14, Tümer discloses an application specific integrated circuit (ASIC) adapted for use in a plurality of circuit configurations (col. 2, lines 18-20, wherein the multichannel readout chip corresponds to an application specific integrated circuit (ASIC)), said circuit configurations providing for different numbers of signal channels for further processing using same circuitry of said application specific integrated circuit (col.2, lines 20-23). In addition, see in particular (col. 2 and 3, lines 64-67 and 1, 10-12 respectively).

Tümer does not expressly disclose summing data on each of at least two channels by the ASIC.

Angelsen disclosed summing data on each of at least two channels by the ASIC (paragraph [0030], wherein the multiplexers outputs are summed producing the summing data of the current of voltage sum) for the purpose of providing the sum signal to the digital beam forming circuits.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Tümer to include summing data on each of at least two channels by the ASIC to provide the summed data in a beam forming circuit.

Regarding claim 15, Angelsen discloses receiving signals from a control circuit instructing that certain of the channels should be divided into symmetric pairs and those pairs added, thereby decreasing the number of output channels; and routing the added pairs to one or more beam formers (paragraph [0036], wherein the array coupling means is for this operation multiplexers that connects the array elements to the appropriate T/R circuits to obtain the same delay for pairs of array elements that are

symmetric around the aperture center corresponds to certain channels devided into symmetric pairs, wherein the pairs added corresponds to multiplexing the pairs, hence decreasing the number of output channels).

Regarding claim 16, Angelsen discloses receiving signals from a control circuit instructing that certain of the channels should be divided into adjacent pairs and those pairs added, thereby decreasing the number of output channels; and routing the added pairs to one or more beam formers (paragraph [0038], wherein the array coupling means is configured so that the multiplexers only use the upper T/R circuits, i.e. they will be adjacent pairs).

Regarding claim 17, Tümer discloses an application specific integrated circuit (ASIC) adapted for use in a plurality of circuit configurations (col. 2, lines 18-20, wherein the multichannel readout chip corresponds to an application specific integrated circuit (ASIC)), said circuit configurations providing for different numbers of signal channels for further processing using same circuitry of said application specific integrated circuit (col.2, lines 20-23). In addition, see in particular (col. 2 and 3, lines 64-67 and 1, 10-12 respectively).

Tümer does not expressly disclose a cross-point switch to increase the number of channels from the ASIC to one or more beam formers.

Angelsen discloses a cross point switch that connects pairs of elements to the T/R circuits, wherein without the cross point switch each element would be connected as one to one to the T/R circuit, hence the cross point switch increased the number of channels form the ASIC while the T/R circuits transmits (see in particular paragraph

[0030], fig. 2d) for the purpose of allowing multiple signals froe the plurality of elements to send data to the beam former.

It would have been obvious to one of ordinary skill in the art at the time of the application to modify Tümer to include cross-point switch to increase the number of channels from the ASIC to one or more beam formers for the purpose of increasing the the number of elements that can send signals to the beam former resulting in multi-line higher quality beam forming.

Regarding claim 18, Angelsen discloses the cross-point switch comprising of receiving signals from a control circuit (paragraph [0031], wherein the control circuit corresponds to the control processor 111) instructing that certain of the channels be routed to one or more of the beam formers (see in particular paragraph [0030], wherein the T/R circuits transmit the information from said channels to the beam forming circuits corresponds to the channels being routed to one or more of the beam formers).

Regarding claim 19, Tümer discloses determining a number of channels for use in a data path (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path corresponds to selecting from the different readout modes, i.e., the sparce, global, trigger, select all external delay, near neighbor, force enable, etc. modes); and configuring an ASIC adapted for use in a plurality of configurations to provide said determined number of channels (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path corresponds to selecting from the different readout modes, by selecting any of the said modes is effectively configuring the ASIC to provide determined number of channels).

Tümer does not expressly disclose a plurality of multiplexers, thereby decreasing the number of channels from a transducer array to a beam former.

Angelsen discloses a plurality of multiplexers, thereby decreasing the number of channels from a transducer array to a beam former (see in particular fig. 2a, wherein after the plurality of multiplexers is a reduced number of channels that are from the transducer array 101 to the beam former 114) for the purpose of an array coupling means wherein the multiplexers are set up so that one can have selectable element control.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Tümer to include a plurality of multiplexers, thereby decreasing the number of channels from a transducer array to a beam former for the purpose of enabling selectable element to T/R circuit connections for one particular transducer array.

Regarding claim 20, Angelsen discloses 2:1 multiplexers (see in particular paragraph [0027], wherein the multiplexers muxing channels A and B correspond to a 2:1 multiplexers), and wherein operating as a plurality of multiplexers comprises selectively enabling one of every two 2:1 multiplexers (see in particular paragraph [0026] wherein the multiplexers are described as flexible, i.e. configurable, so that one can have selectable element connection for one particular transducer array, i.e. coupling 2:1 multiplexers providing additional inputs), thereby providing 4:1 multiplexing functionality (additionally see paragraph [0035], wherein the 4 to 1 multiplexers have inputs configurable to enables any one to 4 of the inputs).

Regarding claim 21, Angelsen discloses stimulating an enable switch on one of every two 2:1 multiplexers by a control signal from a beam former (paragraph [0036], wherein the beam former operates, i.e. controls, the switched array wherein the array being controlled comprises multiplexers that connect the array elements).

19. Claims 10, 11, 13 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tümer (USPN 6,333,648) in view of Knell et al. (USPN 6,468,213 B1).

Regarding claim 10, Tümer discloses an application specific integrated circuit (ASIC) adapted for use in a plurality of circuit configurations (col. 2, lines 18-20, wherein the multi channel readout chip corresponds to an application specific integrated circuit (ASIC)), said circuit configurations providing for different numbers of signal channels for further processing using same circuitry of said application specific integrated circuit (col.2, lines 20-23). In addition, see in particular (col. 2 and 3, lines 64-67 and 1, 10-12 respectively).

Tümer does not expressly disclose an application comprising a transducer, a beam former, and a data path, and wherein the data path is in communication with the ASIC, the transducer, and the beam former.

Knell discloses a transducer (col. 11, line 47); a beam former (col. 11, line 46); and a data path, and wherein the data path is in communication with the ASIC, the transducer, and the beam former (col. 11, line 45-55, wherein the receive signals from the N transducer elements labeled EL0, EL1 ... ELN correspond to communication with

the ASIC, the transducer, and the beam former) for the purpose of the purpose of signal communications.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Tümer to include an application comprising a transducer, a beam former, and a data path, and wherein the data path is in communication with the ASIC, the transducer, and the beam former to enable communication between the essential elements in the system.

Regarding claim 11, Knell discloses a signal processing unit external to the data path and in communication with the data path at a number of points thereon and is operable to capture and insert information in the data path at each of those number of points (col. 19, lines 35-45, wherein the scan converter corresponds to a signal processing unit as disclosed in col. 4, line 66-67, wherein a digital signal processor corresponds to the signal processing unit; col. 20, lines 14-67, wherein the scan converter is external to the data pate and is operable to capture and insert information in the data path at a number of points).

Regarding claim 13, Tümer discloses determining a number of channels for use in a data path (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path corresponds to selecting from the different readout modes, i.e., the sparce, global, trigger, select all external delay, near neighbor, force enable, etc. modes); and configuring an ASIC adapted for use in a plurality of configurations to provide said determined number of channels (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path

corresponds to selecting from the different readout modes, by selecting any of the said modes is effectively configuring the ASIC to provide determined number of channels).

Tümer does not expressly disclose a sonogram imaging system the ASIC, a first beam former, the data path, and a transducer array, wherein the ASIC, the first beam former, and the transducer array are in communication with the data path.

Knell discloses a first beam former (col. 8, line 43), the data path (col. 8, line 61-63, wherein the paths of the transmit and receive beam former functions and the plurality of signals associated travel along the data path), and a transducer array (col. 8, line 58), wherein the ASIC, the first beam former, and the transducer array are in communication with the data path (col. 4, line 22-23, wherein the beam former comprises an ASIC; additionally, see in particular fig. 1, wherein the devices are shown interconnected via data paths). The device elements are all connected via the data path for the purpose communication between said elements.

It would have been obvious to one skilled in the art at the time of the application to modify Tümer to include a first beam former, the data path, and a transducer array, wherein the ASIC, the first beam former, and the transducer array are in communication with the data path to provide an interconnection communication means.

Regarding claim 22, Tümer discloses determining a number of channels for use in a data path (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path corresponds to selecting from the different readout modes, i.e., the sparce, global, trigger, select all external delay, near neighbor, force enable, etc. modes); and configuring an ASIC adapted for use in a plurality of

configurations to provide said determined number of channels (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path corresponds to selecting from the different readout modes, by selecting any of the said modes is effectively configuring the ASIC to provide determined number of channels).

Tümer does not expressly disclose two beam formers in communication with the data path; and operating the two beam formers and a transducer array to form multiple receive beams.

Knell discloses multiple beam formers in communication with the data path; and operating the multiple beam formers and a transducer array to form multiple receive beams (col. 35, lines 46-60, wherein the multiple parallel beams correspond to the multiple beam formers which ultimately control the ultra-sonic pulses to create beams by the transducer array) for the purpose of providing a system that has multiple imaging capabilities such as Color Velocity (encoding the velocity of targets in motion) and Color Power (encoding the power of targets in motion) imaging and Spectral Doppler (including both PW and CW modes).

It would have been obvious to one skilled in the art at the time of the invention to modify Tümer to include beam formers in communication with the data path; and operating the two beam formers and a transducer array to form multiple receive beams as disclosed by knell to enable higher quality imaging and multiple imaging modes.

Regarding claim 23, Knell discloses a multi-line receive operation (col. 9, line 50-51, wherein the multi-line acquisition corresponds to the multi-line receive operation).

Regarding claim 24, Tümer discloses determining a number of channels for use in a data path (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path corresponds to selecting from the different readout modes, i.e., the sparce, global, trigger, select all external delay, near neighbor, force enable, etc. modes); and configuring an ASIC adapted for use in a plurality of configurations to provide said determined number of channels (col. 3 and 4, lines 57-67 and 1-6 respectively, wherein determining a number of channels for use in a data path corresponds to selecting from the different readout modes, by selecting any of the said modes is effectively configuring the ASIC to provide determined number of channels).

Tümer does not expressly disclose programming the signal processing unit with code to provide a mode of functionality not originally included in the platform; and operating the signal processing unit to intercept and insert data along the number of points on the path, thereby instructing the platform to perform the mode.

Knell discloses programming the signal processing unit with code to provide a mode of functionality not originally included in the platform (col. 9, lines 16-43, wherein upgrading and re-programming corresponds to providing a mode of functionality not originally included in the platform); and operating the signal processing unit to intercept and insert data along the number of points on the path, thereby instructing the platform to perform the mode (col.9, lines 52-55, wherein the signal processing unit corresponds to the field gate array and the instructing to perform the mode corresponds to the mode changes, i.e. B/F modes) for the purpose of updating software to include more or revised feature ability and to fix potential bugs not found prior to release.

It would have been obvious to one skilled in the art at the time of the application to modify Tümer to include programming the signal processing unit with code to provide a mode of functionality not originally included in the platform; and operating the signal processing unit to intercept and insert data along the number of points on the path, thereby instructing the platform to perform the mode to enable future flexibility to system software and hardware capabilities and to serve as a tool to repair any software issues not found during the testing phase.

20. Claims 30, 31 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knell et al. (USPN 6,468,213 B1) in view of Kristoffersen (US 2005/0113698 A1)

Regarding claim 30, Knell discloses the ASIC comprising a summation bus (fig. 12A-12M, wherein the summation bus corresponds to the data path of the aggregated channels constructed from the summer; col. 12, lines 17-18, wherein the summation bus is positioned after the summer, i.e. the receive processing path corresponds to the summation bus; col. 18, lines 31-35, wherein the summers described as application specific integrated circuits (ASICs)).

Knell does not expressly disclose cross-point circuitry. However, Kristoffersen discloses cross-point circuitry for the purpose of controlling multiple channel signals for broadband beam forming (see in particular paragraph [0119]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Knell to include cross-point circuitry, since Knell discloses multiple channels as well as receiving data from multiple elements (col. 35, lines 47-60), for the

purpose of controlling multiple channel signals for broadband beam forming in a multi-line ultrasound system.

Regarding claim 31, Knell discloses the ASIC comprising a summation bus (fig 12A-12M, wherein the summation bus corresponds to the data path of the aggregated channels constructed from the summer; col. 12, lines 17-18, wherein the summation bus is positioned after the summer, i.e. the receive processing path corresponds to the summation bus; col. 18, lines 31-35, wherein the summers described as application specific integrated circuits (ASICs); Illustrated in fig. 12A is the summation bus between the summation device 1203 and the smoothing filter 1204 wherein EL0 ... ELN are summed, hence the number of information channels between the transducer and the control circuit are decreased).

Regarding claim 34, Knell discloses a beam former which sends instructions to logic included in the ASIC (col. 3, lines 36-57, wherein the beam former controller comprises an ASIC for control, hence the beam former sends instruction to the logic included in the ASIC).

Knell does not expressly disclose cross-point the ASIC to process data as a cross-point switch. However, Kristoffersen discloses cross-point circuitry for the purpose of controlling multiple channel signals for broadband beam forming (see in particular paragraph [0119]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Knell to include cross-point processing included in the ASIC with instructions sent from the beam former, since Knell discloses multiple channels as well

as receiving data from multiple elements (col. 35, lines 47-60), for the purpose of controlling multiple channel signals for broadband beam forming in a multi-line ultrasound system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MAXWELL A. CLARK whose telephone number is (571) 270-1956. The examiner can normally be reached on Monday to Thursday 7:30A.M. to 5P.M. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

April 2, 2008

/Maxwell A. Clark/

Examiner, Art Unit 2616
/Huy D. Vu/
Supervisory Patent Examiner, Art Unit 2616